

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



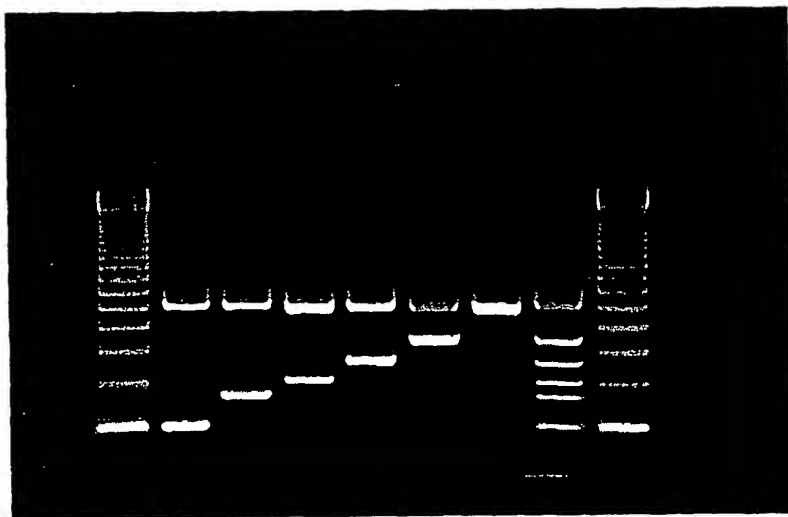
(43) International Publication Date
31 July 2003 (31.07.2003)

PCT

(10) International Publication Number
WO 2003/062463 A3

- (51) International Patent Classification⁷: **C12Q 1/68**
- (21) International Application Number:
PCT/CA2003/000041
- (22) International Filing Date: 7 January 2003 (07.01.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/350,009 23 January 2002 (23.01.2002) US
60/349,981 23 January 2002 (23.01.2002) US
- (71) Applicant (for all designated States except US): **HER MAJESTY, THE QUEEN IN RIGHT OF CANADA**, as represented by **THE MINISTER OF HEALTH** [CA/CA]; Brooke Claxton Building, Tunney's Pasture, Ottawa, Ontario K1A 0K9 (CA).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **WANG, Gehua** [CA/CA]; 1015, rue Arlington Piece T2420, Winnipeg, Manitoba R3E 3P6 (CA). **RODGERS, Frank, G.** [CA/CA]; 1015, rue Arlington, piece T2420, Winnipeg, Manitoba R3E 3P6 (CA).
- (74) Agent: **ADE & COMPANY**; 1700-360 Main Street, Winnipeg, Manitoba R3C 3Z3 (CA).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- (88) Date of publication of the international search report:
18 March 2004
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **ONE-STEP MULTIPLEX PCR FOR THE IDENTIFICATION AND DIFFERENTIATION OF CAMPYLOBACTER SPECIES**



(57) Abstract: Described herein are a plurality of primers which may be used in a multiplex PCR assay in a fast, accurate, reliable and specific fashion for detecting the presence of specific *Campylobacter* strains within a sample. These kits can be used on bacterial isolates and has the potential for use directly on foods and environmental samples.

BEST AVAILABLE COPY

INTERNATIONAL SEARCH REPORT

International Application No

PCT/03/00041

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12Q1/68

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C12Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, BIOSIS, MEDLINE, EMBASE, Sequence Search

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 981 189 A (CHAN VOON LOONG ET AL) 9 November 1999 (1999-11-09) cited in the application abstract; claims 1-3; figure 1	1-3
X	US 5 695 960 A (CHAN VOON LOONG ET AL) 9 December 1997 (1997-12-09) cited in the application abstract; claims 1,2; figure 1 ----- -/--	1-3

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the International filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the International filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

14 October 2003

Date of mailing of the international search report

23. 01. 04

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

Barz, W

INTERNATIONAL SEARCH REPORT

International Application No

PCT/03/00041

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LINTON D ET AL: "PCR detection, identification to species level, and fingerprinting of <i>Campylobacter jejuni</i> and <i>Campylobacter coli</i> direct from diarrheic samples" JOURNAL OF CLINICAL MICROBIOLOGY, vol. 35, no. 10, 1997, pages 2568-2572, XP002257765 ISSN: 0095-1137 abstract	1-3
X	US 5 494 795 A (GUERRY PATRICIA ET AL) 27 February 1996 (1996-02-27) cited in the application abstract; claims 1-6	1-3
X	US 6 001 565 A (JONES DENNIS MACKAY ET AL) 14 December 1999 (1999-12-14) cited in the application abstract; claims 1,4,9-12,19	1-3
X	US 5 691 138 A (STONNET VERONIQUE ET AL) 25 November 1997 (1997-11-25) cited in the application abstract; claims 2,13,14	1-3
X	MORENO Y. ET AL.: "Direct detection of thermotolerant campylobacters in chicken products by PCR and in situ hybridization" RESEARCH IN MICROBIOLOGY, vol. 152, no. 6, July 2001 (2001-07), pages 577-582, XP002257723 ISSN: 0923-2508 abstract; table 1	1-3
X	STEINHAUSEROVA I. ET AL.: "Identification of thermophilic <i>Campylobacter</i> spp. by phenotypic and molecular methods" JOURNAL OF APPLIED MICROBIOLOGY, vol. 90, no. 3, March 2001 (2001-03), pages 470-475, XP002257724 ISSN: 1364-5072 abstract; figures 1,2; table 1	1-3
X	CHUMA T. ET AL.: "Detection of thermophilic <i>Campylobacter</i> from sparrows by multiplex PCR: The role of sparrows as a source of contamination of broilers with <i>Campylobacter</i> " JOURNAL OF VETERINARY MEDICAL SCIENCE, vol. 62, no. 12, December 2000 (2000-12), pages 1291-1295, XP002257725 ISSN: 0916-7250 cited in the application abstract; table 1	1-3

-/--

INTERNATIONAL SEARCH REPORT

International Application No

PCT/03/00041

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DENIS M. ET AL.: "Development of a m-PCR assay for simultaneous identification of <i>Campylobacter jejuni</i> and <i>C. coli</i> " LETTERS IN APPLIED MICROBIOLOGY, vol. 29, no. 6, December 1999 (1999-12), pages 406-410, XP002257726 ISSN: 0266-8254 abstract; figure 1; table 1	1-3
X	O'SULLIVAN N.A. ET AL.: "Detection and differentiation of <i>Campylobacter jejuni</i> and <i>Campylobacter coli</i> in broiler chicken samples using a PCR/DNA probe membrane based colorimetric detection assay" MOLECULAR AND CELLULAR PROBES, vol. 14, no. 1, February 2000 (2000-02), pages 7-16, XP004435439 ISSN: 0890-8508 abstract; figure 1; table 3	1-3
X	WINTERS D.K. ET AL.: "Multiplex PCR detection of <i>Campylobacter jejuni</i> and <i>Arcobacter butzleri</i> in food products" MOLECULAR AND CELLULAR PROBES, vol. 14, no. 2, April 2000 (2000-04), pages 95-99, XP004435432 ISSN: 0890-8508 abstract; table 1	1-3
P,X	WANG G. ET AL.: "Colony multiplex PCR assay for identification and differentiation of <i>Campylobacter jejuni</i> , <i>C. coli</i> , <i>C. lari</i> , <i>C. upsaliensis</i> , and <i>C. fetus</i> subsp. <i>fetus</i> ." JOURNAL OF CLINICAL MICROBIOLOGY, vol. 40, no. 12, December 2002 (2002-12), pages 4744-4747, XP002257727 ISSN: 0095-1137 the whole document	1-3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA 03/00041

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

s. PCT/ISA/210 annex

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-3 (all partially)

Primer pair consisting of at least 15 contiguous nucleotides of SEQ ID NO:1 or SEQ ID NO:2, detection method using said primer pair and kit comprising said primer pair.

2. claims: 1-3 (all partially)

Primer pair consisting of at least 15 contiguous nucleotides of SEQ ID NO:3 or SEQ ID NO:4, detection method using said primer pair and kit comprising said primer pair.

3. claims: 1-3 (all partially)

Primer pair consisting of at least 15 contiguous nucleotides of SEQ ID NO:5 or SEQ ID NO:6, detection method using said primer pair and kit comprising said primer pair.

4. claims: 1-3 (all partially)

Primer pair consisting of at least 15 contiguous nucleotides of SEQ ID NO:7 or SEQ ID NO:8, detection method using said primer pair and kit comprising said primer pair.

5. claims: 1-3 (all partially)

Primer pair consisting of at least 15 contiguous nucleotides of SEQ ID NO:9 or SEQ ID NO:10, detection method using said primer pair and kit comprising said primer pair.

6. claims: 1-3 (all partially)

Primer pair consisting of at least 15 contiguous nucleotides of SEQ ID NO:11 or SEQ ID NO:12, detection method using said primer pair and kit comprising said primer pair.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/03/00041

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5981189	A	09-11-1999	US 6013501 A	11-01-2000
			US 5695960 A	09-12-1997
			AU 6718894 A	12-12-1994
			DE 69405989 D1	06-11-1997
			DE 69405989 T2	19-02-1998
			EP 0698104 A1	28-02-1996
			AT 158815 T	15-10-1997
			WO 9426907 A1	24-11-1994
US 5695960	A	09-12-1997	US 5981189 A	09-11-1999
			US 6013501 A	11-01-2000
			AT 158815 T	15-10-1997
			AU 6718894 A	12-12-1994
			WO 9426907 A1	24-11-1994
			DE 69405989 D1	06-11-1997
			DE 69405989 T2	19-02-1998
			EP 0698104 A1	28-02-1996
US 5494795	A	27-02-1996	NONE	
US 6001565	A	14-12-1999	AT 228572 T	15-12-2002
			AU 680548 B2	31-07-1997
			AU 7618394 A	27-03-1995
			CA 2168648 A1	16-03-1995
			DE 69431802 D1	09-01-2003
			EP 0717780 A1	26-06-1996
			WO 9507362 A1	16-03-1995
			JP 9502100 T	04-03-1997
			US 6080547 A	27-06-2000
US 5691138	A	25-11-1997	FR 2701028 A1	05-08-1994
			AT 195974 T	15-09-2000
			CA 2132985 A1	04-08-1994
			DE 69425708 D1	05-10-2000
			DE 69425708 T2	19-04-2001
			DK 636187 T3	18-12-2000
			EP 0636187 A1	01-02-1995
			ES 2150981 T3	16-12-2000
			WO 9417205 A1	04-08-1994
			JP 7505535 T	22-06-1995